The Napoleon Series

Natural Dye and Uniforms

By: Richard Tennant

Throughout history, people have dyed their textiles using common, locally available materials. Plant-based dyes such as woad, indigo, saffron, and madder were raised commercially and were important trade goods in the economies of Asia and Europe.

Apart from the use of dyes made from local materials, by the period of the Napoleonic Wars, a significant international trade had also developed in dyestuffs. As a response to the naval blockade of the French coasts enacted by the British government on 16 May 1806, Napoleon issued the Berlin Decree on 21 November 1806, which brought into effect a large-scale embargo against British trade.

As far as dyestuffs were concerned it meant that luxury products like indigo, quercitron,[1] fustic[2] and cochineal[3] could not be imported into mainland Europe, but also that madder could not be exported from the Netherlands to the UK. This meant that there needed to be much more reliance on local dyes for the increased manufacture of cloth for military uniforms. The cloth for private soldiers used up until the late 18th century was plain weave broadcloth weighing 16 ounces per square yard, made from coarser blends of wool.

Natural dyes are dyes or colorants derived from plants, invertebrates, or minerals. The majority of natural dyes are vegetable dyes from plant sources—roots, berries, bark, leaves, and wood—and other biological sources such as fungi and lichens. Typically, the dye material is put in a pot of water and then the textiles to be dyed are added to the pot, which is heated and stirred until the color is transferred. Textile fibre may be dyed before spinning ("dyed in the wool"), but most textiles are "yarn-dyed" or "piece-dyed" after weaving. Many natural dyes require the use of chemicals called mordants to bind the dye to the textile fibres. Tannin from oak galls, salt, natural alum, vinegar, and ammonia from stale urine were used by early dyers. Many mordants, and some dyes themselves, produce strong odors, and large-scale dyeworks were often isolated in their own districts.

Red

A variety of plants produce red dyes, including a number of lichens, henna, alkanet or dyer's bugloss (*Alkanna tinctoria*), asafoetida and dyer's madder *Rubia tinctorum*.[4]

Madder and related plants of the genus *Rubia* are native to many temperate zones around the world, and were already used as sources of good red dye, such as rose madder, in prehistory. Madder was a dye of commercial importance in Europe, being cultivated in the Netherlands and France to dye the red coats of military uniforms.[5]

---

[1] A yellow dye made from the Eastern Black Oak tree.
[2] A yellow dye made from the fustic tree.
[3] A red dye made from the cochineal insect.
[4] Natural Colourants with Ancient Concepts and Probable Uses
[5] Dyes from Antiquity to Synthesis

Madder in the Netherlands
Zierikzee is a small medieval town on the Eastern Scheldt shore, 40 miles southwest of Rotterdam. It was an extremely important site of madder production, the plant used widely for the production of red dye. One of the life-sizes figures made by Gerry Embleton shows a madder inspector tasting the product and testing it for quality. Image Curtesy of Gerry & Anne Embleton

Kermes is a red dye derived from the dried bodies of the females of a scale insect in the genus *Kermes*, primarily *Kermes vermilio*. The *Kermes* insects are native in the Mediterranean region and live on the sap of the Kermes oak. They were used as a red dye by the ancient Greeks and Romans. The kermes dye is a rich red and it had good colour fastness in silk and wool. By the 14th and early 15th century, brilliant *full grain* pure kermes scarlet was "by far the most esteemed, most regal" colour for luxury woollen textiles.[6]

Following the Spanish conquest of the Aztec Empire, Mexican cochineal, which produced a stronger dye and could thus be used in smaller quantities, replaced kermes dyes in general use in Europe. By the 1780's Spain and Portugal had a worldwide cochineal dye monopoly via their New World colonial sources.

The dye used for privates' coats of the British infantry, guard and line, was madder. It was recognised as economical, simple and reliable and remained the first choice for lower quality reds from the ancient world until chemical dyes became cheaper in the latter 19th century. The ready availability of red pigment made it popular for military clothing and the dying process required for red involved only one stage. Other colours involved the mixing of dyes in two stages and accordingly involved greater expense. The plant was grown in southern England and continental Europe, but was traditionally imported to Britain from the Netherlands where large areas of madder were grown in the sandy soil. In 1804 the English dye maker George Field refined the technique of making an improved pigment from madder by treating it with alum and an alkali.[7]

Even so, it is highly likely that the Redcoat wool came in many different shades of red even when it was new. Add to that, the natural sun-bleaching in the field, and the continual soaking and drying experienced by the soldiers, it would fade the tunics to a pink or ruddy or russet-brown on a long campaign in a hot climate.

The non-commissioned officer's red coat issued under the warrant of 1768 was dyed with a mixture of madder-red and cochineal to produce a "lesser scarlet"; brighter than the red worn

[6] Kermes (Dye)
[7] Red Coat (Military Uniform); Putting the Red in Redcoats

by other ranks but cheaper than the pure cochineal dyed scarlet garment purchased by officers.[8]

Yellow

Yellow dyes are "about as numerous as red ones", and can be extracted from saffron, pomegranate rind, turmeric, safflower, onionskins, and a number of weedy flowering plants. Limited evidence suggests the use of weld (*Reseda luteola*), also called mignonette or dyer's rocket before the Iron Age, but it was an important dye of the ancient Mediterranean and Europe and is indigenous to England.Two brilliant yellow dyes of commercial importance in Europe from the 18th century are derived from trees of the Americas: quercitron, native to eastern North America and fustic from the West Indies and Mexico.[9]

Green

Plants that yield green dyes are rare. Both woad and indigo have been used since ancient times in combination with yellow dyes to produce shades of green. Medieval and Early Modern England was especially known for its green dyes. The dyers of Lincoln, a great cloth town in the high Middle Ages, produced the Lincoln green cloth. The dyers of Lincoln produced the cloth by dyeing it with woad (*Isatis tinctoria*) to give it a strong blue, then overdyeing it yellow with weld (*Reseda luteola*) or dyers' broom, *Genista tinctoria*. Woolen cloth mordanted with alum and dyed yellow with dyer's greenweed was overdyed with woad and, later, indigo, to produce the once-famous Kendal green (which was a greyish green).[10]

Lichen can also be used to produce a wide range of greens, oranges, yellows, reds, browns, and bright pinks and purples. Scottish lichen dyes include cudbear (also called archil in England and litmus in the Netherlands), and crottle. Cudbear was patented as a dye by Dr. Cuthbert Gordon in 1766. Olive greens were also made by dying the textiles yellow and treating with an iron mordant. [11]

Most of the numerous Russian regiments traditionally wore green jackets, the colour which had been introduced by Peter The Great in 1700. Whilst this is officially described as ‘dark green’, examples and illustrations tend to indicate a more ‘dark olive green’. Not enough is known about the Russian economy and its crafts at this time to say whether the base of their green was from blue or yellow dyes.[12]

Blue

Blue colorants around the world were derived from indigo dye-bearing plants, primarily those in the genus *Indigofera*, which are native to the tropics. India is believed to be the oldest center of indigo dyeing in the Old World. It was a primary supplier of indigo dye to Europe as early as the Greco-Roman era.

In temperate climates including Europe, indigo was obtained primarily from woad (*Isatis tinctoria*), an indigenous plant of Assyria and the Levant which has been grown in Northern

[8] Putting the Red in Redcoats
[9] Dyes, Colours, & Pigments
[10] Lincoln Green
[11] Dyeing with Lichens
[12] Natural Dye

Europe over 2,000 years, although from the 18th century it was mostly replaced by superior Indian indigo imported by the British East India Company.

Woad was one of the three staples of the European dyeing industry, along with weld (yellow) and madder (red). *Isatis tinctoria*, also called woad, dyer's woad, or glastum, is a flowering plant in the family Brassicaceae. Woad is also the name of a blue dye produced from the leaves of the plant.

Long important as a source from which is obtained a blue dye, indigo, it has been cultivated throughout Europe, especially in western and southern Europe, since ancient times. In medieval times there were important woad-growing regions in England, Germany and France. Towns such as Toulouse became prosperous from the woad trade. Much of the woad produced here was used for the cloth industry in southern France, but it was also exported via Bayonne, Narbonne and Bordeaux to Flanders, the Low Countries, Italy, and above all Britain and Spain.

In medieval England the centres of woad cultivation lay in Lincolnshire and Somerset. In the German states a major market for woad was at Görlitz in Silesia. The citizens of the five Thuringian Färberwaid (dye woad) towns of Erfurt, Gotha, Tennstedt, Arnstadt and Langensalza had their own charters.

Prussian blue was first synthesized about 1706 by the reaction of iron(II) salts with potassium ferrocyanide. In 1709 it was named *Preußisch blau* and *Berlinisch Blau.* Initially it was only used as artists' pigment. From the beginning of the 18th century, Prussian blue was the predominant uniform coat color worn by the infantry and artillery regiments of the Prussian Army. As *Dunkelblau* (Dark blue) this shade achieved a symbolic importance. However, Prussian Blue dye was only developed commercially in 1774.[13]

The dye chemical extracted from woad is indigo, the same dye extracted from "true indigo", *Indigofera tinctoria*, but in a lower concentration. Indigo remained a rare commodity in Europe throughout the Middle Ages. Following the European discovery of the seaway to India, great amounts of indigo were imported from Asia. Because of its high value as a trading commodity, indigo was often referred to as blue gold. Much European indigo from Asia arrived through ports in Portugal, the Netherlands, and England. Spain imported the dye from its colonies in South America. France and Germany outlawed imported indigo in the 16th century to protect the local woad dye industry. The commercial growing of Indigo started in England in 1745.

In 1806, the same year that Britain enacted its naval blockade, the French army returned to a white coatee for the infantry, due to the shortage of imported indigo dye. This order was rescinded the following year when it was found that dyestuffs from locally produced woad could be obtained in sufficient quantities.

Brown

Walnut husks are often used to create a rich yellow-brown to dark brown dye used for dyeing fabric and for other purposes. The dye does not require a mordant and will readily stain the hand if picked without gloves. The common name *walnut* derives from Old English

[13] Prussian Blue

wealhhnutu, literally 'foreign nut' (from *wealh* 'foreign' + *hnutu* 'nut'), because it was introduced from Gaul and Italy. The Latin name for the walnut was *nux Gallica*, "Gallic nut".

During the Napoleonic period the locally available cloth was brown and was widely used for military uniforms in both Portugal and Spain. Walnuts were first brought to Spain by the Romans. There are over 15 varieties of walnut, but it is the common walnut that is most frequently found in Spain and Europe. Traditionally Spain is one of the world's top consumers of walnuts; they are also popular in Portuguese cuisine. The walnut's characteristic large bearing and broad canopy with large leaves can be found all over Spain, but the main growing regions are Galicia, Catalonia, Extremadura and Andalusia. In Portugal they are also grown from the Oporto region south to the Algarve.

The Austrian artillery wore brown uniforms throughout this period.

White

An important aspect of the weaving industry was bleaching cloth. At that time this involved treatment with stale urine and leaving the cloth exposed to sunlight for many months in so called bleaching fields. Around 1790 in Renfrewshire Scotland, Charles Tennant, who had been a weaver, set about developing ways to shorten the time required in bleaching. Others had already done much work on this problem and managed to reduce bleaching time from eighteen months to four by replacing sour milk with sulphuric acid in the bleaching process. Further, in the last half of the eighteenth century, bleachers started to use lime in the bleaching process, but only in secret due to possible injurious effects from the lime. Charles had the original idea that a combination of chlorine and lime would produce the best bleaching results. He worked on this idea for several years and was finally successful. His method proved to be effective, inexpensive and harmless. He was granted patent on 23 January 1798. He continued his research and developed a bleaching powder for which he was granted patent on 30 April 1799.

In the early years of the 18th century both the French and Austrian armies wore their own variation of the serviceable and cheap light or pearl grey of undyed wool. By the latter half of the century these uniforms had become white. Austria continued with white uniforms for its line infantry regiments throughout the Napoleonic Wars.

> "White stood out in the field, when one of the functions was to make a good show. In the course of time coats of blue faded badly, those of pike grey turned a dirty ashen colour, and those of green assumed a tinge of yellow, while repairs were all too evident on dyed coats of any kind, and added to a general look of shabbiness. Coats of white, on the other hand, could always be worked up with chalk to make them look 'new and brilliant."[14]

Sources:

Charles Tennent
Duffy, Christopher. *Instrument of War (The Austrian Army in the Seven Years War)*. Chicago: Emperor's Press, 2000.
Dyeing with Lichens

[14] Duffy; Vol. 1, page 130

Dyes, Colours, & Pigments
Dyes from Antiquity to Synthesis
Extraction of Dye from Walnut Shell and Dyeing of Natural Fibre
Indigo Dye
Isatis Tinctoria
Kermes (Dye)
Lincoln Green
Natural Colourants with Ancient Concepts and Probable Uses
Natural Dye
Prussian Blue
Putting the Red in Redcoats
Red Coat (Military Uniform)
Reseda Luteola
Scarlet

Placed on the Napoleon Series: October 2018